Notebook, N-88-08-23

This notebook, which covers the period August 1888-October 1889, is a continuation of N-87-01-01. It was used by Jonas W. Aylsworth to transcribe the results of experiments, nos. 831-1090, on wax compounds for phonograph cylinders. The rough records of these experiments can be found in N-88-01-02, N-88-11-13.3, and N-89-05-30.2. The front cover is marked "#565" and "United States Circuit Court District of New Jersey American Graphophone Co vs National Phonograph Co No. 10 March Term 1905 Defendant's Exhibit Aylsworth Note-book No. 565." The book contains 187 numbered pages. At least one page was removed before the book was paginated.

N-88-08-23

564

Should be "565"
see outside cover
"564 is N-870181
TJB

Wray Cesewski
July 21-87

XE-2449

Oil samples [illegible] 1.

[illegible] from Book 5-64, [illegible]

#10 U.S.

Fatty acids precipitated from Ceylon Cocoa nut Oil by saponification and H.Cl.

#11.0.S.

Fatty acids obtained from poorer grade of C.N. oil by saponification and precipitation by H Cl.

#12 O.S.

Fatty acids in similar manner to above from #2 Cocoa N. Oil - 100
Oleic acid — 15

#13 O.S.

Ceylon Cocoa nut Oil at present worth in large lots about 6 1/2 ¢ per lb.

#14 O.S.

Poorer grade #2 of Cocoa nut Oil at present worth in large lots, about 5-1/2 ¢ per lb.

#15-O.S.

Oleic acid treated with hydrochloric acid just enough being used to convert [illegible] into chloride of sodium, other fact not commented, filtered.

Continuation of (2)

Metallic Soaps from Book, 5-64,

No

8/23/88.

131. Cocoa nut Oil #2 — 200 gms.
Oleic Acid — 30 " -
Stan. Sol Lye — 138 cc

Saponified by heating, to white semi transparent mass. Clear solution in hot H_2O. Precipitated by acetate lead, to white granular lead soap - softer than that of #30. Melted down was like #30 except slightly more transparent & lead slightly softer cut.

132. Cocoa nut Oil #2 = 300 gms.
Stan. Sol lye — 190 cc

Fatty acids precipitated from aqueous solution of soap - cut of fatty acids obtained — 264 grms a loss of 11 1/16 % in glycerine and volatile fatty acids.

No Mutaki Soaps

1833 Cocoa nut Oil #2 — 200 gm.
Oleic acid — 201
Stan dd lye — 132 cc
Saponified to white soap, in water and appearance was like #30 of #31.
Precipitated by sat'd salt soln to white mass like that of #30 & #31.

8/23/88.

1834 Cocoa nut Oil — 200 gm.
Oleic acid — 40 "
Stan dd lye — 144 cc
Did not entirely saponify — soap amber colored — rather cloudy solution in H_2O.
Oil that floated on solution skimmed off. Saponified & precipitated by sat'd salt soln. Straighter and heavier mulled to clean bi gemid & cooled to very transparent mass cut fine — fractures brittle — effluent hot water.

Bang up-!

Mg Metasilicate Soaps 8/23/88

834 Portion of soap solution of #833 precipitated by mixture of about equal parts magnesium & lead acetate. Formed white adhesive mass. Melted down to clear liquid & cooled transparent, more so than #831. Cut good - worth experimenting on.

8/23/88.

836 Portion of soap solution of #834 precip'd by mixture of lead acetate & magnesium acetate 1 of lead to 2 of Mg. Formed white adhesive mass. Melted down to clear liquid cooled to dark amber mass more transparent than #834

No. Mutatis soaps 8/24/88.

937 Cocoa Nut Oil #2 — 200 gms
Oleic Acid — 40 ll.
Stan sol lye — 168 cc
Same as # 34 exceptin mass of lye.

938 Cocoa Nut Oil #2 — 8/24/88. 200 gms
Oleic Acid. — 50 ll
Stan Sol lye — 150 cc.
Saponified difficultly but by prolonged heating turned into rather dirty hard, white soap which gave fairly clear solution in hot H_2O.
Precipitated by brine lead to white hard granular mass, greater size of shot. Very nice to work. When melted clear, when cold whitish translucent - not gray - slightly tougher + more adherent than pure Oleic

No. Imitation Soaps 9/24/34.

939, Fatty acids from #2 Cocoa Oil) 100 gms
Oleic acid — 25- "
Stem Sol lye — 31.5 cc.

940, Cocoa N. Oil #2 — 1000 gms.
Oleic acid — 200 "
Stem Sol lye — 280 cc.
Same as # 834 only increase
of 5 cc of lye for 100 cc Oil,
Acted similar to #934.
This was made nearly c.p.

No. Metallic Soaps. 7/21/88.

741. Cocoa Nut Oil — 1000 gm.
Stan Sol Lye — 600 cc.
Saponified by continued application of heat, but did not give clear solution in water, even after prolonged boiling — a hard white scum formed on top of solution. Precipitated by acetic leaded to white waxy adhesive when hot, hard and granular when cold.

7/30/88.

742. Cocoa nut oil — 100 gm.
Sol lye sp gr 1.40 — 50 cc.

7/30/88.

743. Cocoa nut oil — 100 gm.
Oleic acid — 5 gm.
Sol lye — 40 cc.

(15)

No. Unmedicated Soap. 9/30/88.

944. Stearic Acid — 100 gm.
Cocoa nut Oil — 50 "
Olein acid — 10 "
Sol Lye 1.40 sp gr 48 cc.

9/30/88.

945. Stearic Acid — 100 gm.
Cocoa Nut Oil — 50 "
Olein acid — 15 "
Lye Sol 1.40 sp gr — 49.4 cc.

946. Stearic Acid — 100 gm.
Cocoa Nut Oil — 50 "
Olein acid — 20 "
Lye Sol - 1.40 sp gr — 51 cc.

No. Water Soaps. 9/27/27.

847. Cotton seed oil — 100 gms.
Sol Ivy — 80 cc.
Saponified with difficulty to yellowish soap. clear sol, precipitated by $C_4H_4Pb_2O_4$ to sticky mass.
When melted Pb-O released. Probably too much Ivy was used that is not all the fat saponified and what did took long steam of Ivy. which is substituted by equivalent quantity of lead when precipitated.

848. Cotton seed oil — 200 gms.
Ivy sol 1.4 sp.gr. — 80 cc.
Saponified same to #47.
Precipitated by ~~Hcl~~ acetate lead to white sticky mass
When melted assembled plastic. Oil smell except slightly yellow color

No. Medatia Soaps. 9/31/97.

949. Cotton Seed Oil — 100 gm.
Stearic acid — 100 "
Olein " — 50 "
Sol lye - 1.4 - 100 cc.
Saponified 5hrs, to clear solution precipitated by $C_4H_6P_2O_7$ to sticky white mass, melted down to crumbly cotton mass.

9/31/97.

850. Stearic Acid — 100 gm.
Cotton Seed Oil — 66.6 "
Sol lye — ~~with 1 gm~~ 2 cc.
Saponified to hard granular soap, clear solution precipitated by lime water to cotton fleecy mass. Rather cotton [illegible] melted down, cut fair but weak.

(21)

Mo Metallic Soaps 8/31/89

967, Stearic acid — 100 gm.
Cocoa nut Oil — 44 "
Oleic acid — 22 "
Lye solution — 49.80 c.c.
Saponified with difficulty to granular dirty white soap. Hardly clear solution. Precipitated by acetate lead to pretty divided white mass, melted - clear + hard gray, powdery cut when cold.

8/31/89

962, Cocoa nut Oil — ~~44~~ 100 gm.
Stearic acid — 100 "
Oleic Acid — 30 "
Sod lye — 30 c.c.
Acted like #967 + appeared the same slightly less powdery to cut.

No. Metallic Soaps. 8/31/38.

95-3. Stearic Acid — 100 grms.
Palm Oil (crude) — 44.5 "
Cotton seed Oil — 22.5 "
Sod Leg. 140°. — 67 c.c.

8/31/38

A serious obstruction was here found in all cylinders made of cocoa nut oil, palm oil, cotton seed, and in fact all the oils and fats, in the shape of minute bubbles which could not be seen by the naked eye, but could be very distinctly heard in the phonograph as a crackling and scratchy noise, and could be seen under the microscope. These were found, after a series of experiments, to be caused by glycerin, decomposing slowly while the wax is melted

giving off acroleine & water, also to the vaporisation of the glycerine.

It was found that glycerine always occured in the wax unless it was especially well made and washed, with alcohol after precipating or other processes which would make it to expensive for practice. The point at which these bubbles formed could be raise by heating the melted wax very hot and letting it settle and then to the temperature required in molding but this operation spoiled the quality of the wax, and then great care had to be taken to run it high enough each time and not to let it get to high in molding. which also gotten made it impractical.

So the only way left was to use fatty acids and not natural fats or oils.

(28)

Mo. Metalic Soaps

354. Sticky oxydized linseed oil, 200 grams heated with 70cc of 14% Na Oh solution boiled to dryness then water is added and boiled until it looks like soft soap; then it is precipitated by acetate lead.

355 Same solution as 354 precipitated by alum.

No. Metallic Soaps.

956. Stearate of alumina made by fusing stearic acid and chloride of alumina, together adding the latter little by little until the mass becomes brisk even at high heat.

957. Stearate of Soda.

Made by adding dissolved caustic soda to melted stearic acid. It must be added slowly to the acid, and after some is added the higher stearate formed is allowed to ~~settle~~ dissolve in the stearic acid, more heat being applied as the melting point of the mass raises, as more soda is combined with the stearic acid. To 1000 gm

No. Mustatic Soap.

of stearic acid about 100 gms of Na HO (lewis) was used. This makes a soap, of a light brown color, with a very high melting point, which when forced out and cooled becomes amorphous on the cooling surface but crystaline on inside. It is almost perfection on the phonograph (the amorphous outside) as far as articulation cut and scratch are concerned, but when the cooling surface has been cut through it becomes scratchy and, no good, also it will absorb moisture on hot damp days, which would spoil any record put on it.

No. Mutatis Stearic

858. Stearic Acid 5-00
NaHO. (Saus.) 3.7 } dissolved in
acetate Al. (Sic) 1.3 } H_2O, together.

The object of this experiment is to take the crystalization out of stearate of soda, and to make it mold better. Came out heavy up, non crystalline, good cut, molded first class - but was electrical. Not so likely to absorb moisture.

859. Stearate of soda No 85-7, melted with about ⅓ stearate of Mg. (made by adding acetate of mag or common mag to magnesia to fused stearic acid, until a translucent amorphous mass is obtained which has a slightly brownish yellow color.) This makes a wax with a very good cut, non electric, strong, but hard

No Mutatis Soaps.
too high a melting point to be practical.

860. Stearic acid 1000 gm.
Acetate of Barium about 100 gm.
Fused together.
Forms a hard high melting point amorphous solid which has a poor cut.

860½ #860 With free stearic acid.

861 No. 860 mixed with No 855 in various proportions none of which were as good as No. 858.

862 Stearate of Strontium, made same as No 860 which it much resembles.

No. Metallic Soaps.

963 Stearate of Strontium mixed with #857 in various proportions. Good but not equal to #858.

964 Stearate of Al. (white)
To fused stearic acid acetate of Al is added until a white hard non crystalline, cohesive to cut, wax is obtained. It forms a liquid about as thick as MO 857, which solidifies at very low tem, in fact it can be found in the hand and left to cool, but when once solid its melting point is very much higher. Molds good, is insoluble, tastes good, cuts good, contracts scarcely any in mold, loses scratch when 857 very identical.

It was after word found that #864 changed on surface after standing a while becoming porous. It is really a mixture of or compound of stearate of Al & acetic acid, the latter of which evaporates, when #864 is heated very hot it loses its white waxy appearance, and becomes distinctly crystalline. This have a remarkable contraction when cooled in several forms.

No. Metallic Soaps.

865. Stearate of lead mixed with various proportions of stearate of alumina,
None of these equaled #858,

866. Stearo Sulphuret of Soda.
Made same as No 857 except hydro sulphuret of soda (NaSO) is used in place of NaHO,
This gives very good wax which is very similar to No 1, and if any thing better. But #858 is better and more practical.

867. Stearic acid — 1200 gm:
Lewis Syst(em) 900 "
Autoclave (air) 433 "

11 M.O. Metallic Soaps

acetate of alumina and denatured alcohol are dissolved together in water so as to make a concentrated solution. The stearic acid is melted in iron kettle and heated to 240° F then the solution is added same as in M.O. 57 the temperature ranging between 240° to start and 380° at finish. This is cooked a day and a half or until bubbles stop coming. This is intended as a duplicate of # 858 except a little more soda & alumina is added. Came out same as # 858 except a little better. It was of a reddish color due to iron kettle. This material when cooked at

No. Melotti Soap

a high tem peratur (400°F) is much improved but is rendered less easily molded, on account of the melting point raising.

This wax seems all right except if a very dif trade is made by the phono needle it slips out; seems to be a little too much Al. in it.

968. Stearic Acid 2000 gm.
Acetate Al. (not air) 72 "
Lewis Lye 153 "

Done same as # 967 except it was done in chilli pan.

This was a slight improvement on # 967.

Mo Mustahi Soaps.

869. # 867 with a little ley and stearic acid added.
This is much better and only remains to get correct proportion to make it O.K.

870. Mo 867 heated up to 500° F. for some time.
Somewhat improved

871 # 867 – 300 gms.
Stearic Acid 50 "
Caustic soda 5 "
This is very good in all respects and when filtered is perfection almost.

872. #871. Duplicated.
Came out the same.

No. Mustard Soaps

873. Stearic Acid 50 gm.
#867 — 500 "
Caustic Soda 10 "
Very good only little harder to mold and filter than No 871,

874 Third duplicate of # 871 came out all right.

875. Fourth duplicate of # 871.
Caustic soda & crystals of Al. dissolved in water same as 867, this is filtered, and when measured out equaled 2370 CC of 1,3800 Sp Gr. at 80° F.
Stearic — 1400 gm.
Soda — 1100 "
Al — 440 "

No. Mutabic Soaps

In making the temperature did not exceed 390°F. After all the solution had been taken up it was kept at about 360 or less for half a day. It took 1½ days to make.

974 #971 is melted and heated to 360°F then filtered through filter paper, in oven, filters very slow, about a drop in two seconds or less. Makes perfect cylinder when filtered

977 On molding #971 The material is melted and heated pretty hot, until it gets dark in color; this is then filtered through dia nese ~~nephkins~~ and molded in mold heated to

No. On Molding & filtering

130° F. The mold was not hot enough, and the consequence was a seam down the side of cylinder where the wax was first poured in.

878. Same as # 877 except it is molded in old mold with cold core, and shell heated to 130° F. Shell was coated with asbestos paper. This came out fairly good.

879. Temp of wax 329° F.
" " mold (shell) 212 F
" " " core 212° F.

Molding.

880. Temperature of Wax — 350°F.
" " " Mold (shell) 212°F.
" " " Core 90°F.

Time left in mold before withdrawing 18 min.
The wax was found in best. This cylinder was better than #879, but had sunken in places on outside of cylinder, caused by shrinkage by air bubble which is greatly expanded while hot and which collapses when cold, the bubble might be very deep in the cylinder.

No Molding #871.

891. Tem. of mold (shell) 72° F.
" " " (core) 72° F.
" " wax 360° F.

Mold is jacketed with asbestos on the outside,
Material poured in fast.
Played in 10 min. when
wath was poured on inside
of core to cool it so that
it could be withdrawn,
Came out fairly good.
but was slightly sunken in
large spots.

892. Tem of Mold (shell) 90° F.
" " " (Core) 90° F.
" " Wax 350° F.
Used the thin core belonging
to old mold of white old reg)

No. Molding, # 821.

833. Temp of mold 70° F
" " wax 350° F.

Heavy core, wound with Harriet Clarke # 30 spool cotton.
This molded very good item was slight seam left in one side where the stuff was forced in. The core came out nicely leaving the inside beautiful.

834. Temp of Wax — 356° F.
" " Mold (shell) 140° F,
" " " (core) 80° F.

Heavy core, wound with Clarke's spool cotton # 24,
Poured in wax medium fast.
Came out very good except for slight roughness on surface

No Dr Molding 8.71.

995 Same as # 994. except inside of mold (shell) is polished and gate is heated to 300°F.

996 Tem. of mold (shell) 120°F
" " " core 78°F
" " " wax 325°F

Core wound with #40 Clarks' thread inside of shell of mold lined with parchament paper. Came out wrinkled from the warping of the paper but wrinkles were fine and not very deep No seam was left on cylinder Very good.

No. Molding. # 15.

887. # 15 (not filtered)
Jam of mold (shell) 130°F.
" " " (core) 130°F.
" " wax 350°F.
Core wound with No 40 (Clarks) thread & inside of mold lined with writing ~~paper~~ paper.
Came out with less wrinkles but what there were, were very deep and long.

888. Jam of mold 100°F
" " wax 325°F.
Cotton thread ~~wound~~ wound core, inside mold, lined with tissue paper.
Wax ran on both sides of paper. no good.

Filtering # 891

~~Modelling # 641.~~

No.

889. Filter heated by gas shaped flame

Jam of wax in filter 350°F
amount per hour - 10½ oz.
common filter paper
was used

890. Same as 889, only this is result of second hour. only about half as much came through.

891 Large size cylinders weigh 3 3/8 oz just as they come out of the mold.
or 96½ gm
30.9 lb wax = 144 cylinders.
30.9 lb = 14000 gm.

Standard Solution of Ley and Alumina Acetate.

Lewis Soda — 1100 gm.
Acetate of Al (dyl) — 440 "
Dissolved in enough water to make sp. gr. equal 1,3800 at 60°F. after filtering.

Mo.	Molding	84	(63)
892.	The best proportions for #871 are— To 14000 gm stearic acid, use 2370, cc. of standard solution of ley (see opposite)		
893.	Cylinder molded same as #881, except core is wound with thread, and gate of mold is heated to nearly same temp as wax. After filling the gate with wax around the gate and let it go in as fast as it would, forming at same time, came out bubbly.		
894.	#871 filtered through twill. Wax at about 96.0°F in filtering came through fairly fast.		

No. Molding & Stitching.

995 Tem of mold 200°F.
" " wax 340°F.
" " gate 300°

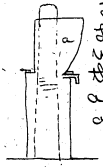
Core thread wound, inside of mold lubricated with glycerine after cylinder is cold it is coated on inside with elastic laquer (gun cotton in acetate of amyl) to make the thread stick tight. Any color could be given to the thread in this way, by dissolving the colors in the laquer. The thread sticks very well.

896 Done in gas heated filler.
Tem of wax 330°F.
Used twill muslin as filler medium
Amount per hour 1lb 2¼ oz.

No. Filtering & Molding.

897. Same as # 896, with a new ray and temperature a little hotter.
Amount pig iron - 2 lb 3 oz.

898. Molded in large gate mold as shown —



Thread covered core
Gate filled up with the cut off closed then the cut off opened and gate filled up again.

Temp of iron 240°
" " mold 212°
" " core 100°
" " gate 240°

No. Molding.

899. Same mold as in 898.

Tem. of wax 340° F.
" " mold 55°
" " core 100°
" " gate (a) 240°

Core thread wound.
Gate filled with cut off closed then gate opened and filled again, to give pressure to that which is already in.

900. Mold made with jacket on outside to pass cold water, or steam as the case requires.

Sect of mold.

The mold was warmed a little, and the wax poured in at 360°. Immediately after wax was poured cold water was forced through the jacket, the cylinder came out a true cylinder, perfect, not a rough place or pit or air hole, two specimens

No.	Molding.
901	Mold wrapped on outside and in the center with copper wire so as to give more mass of metal at center, and to keep the cylinder from warping in cutting. Worked in a medium.
902.	Bore covered with paper, ordinary news paper, came out nicely but cracked when it became cold.
903.	Core wound with heavy string cracked.
904	Core wound with silk thread did not stick good.
905	Core wound with spiral strip of paper. good, no cracks.

Molding

906. Core thread wound, found at regular temp (350°-360°) in slightly warm mold. Cylinder left on core until it had become dead cold. It did not crack and was perfectly true in side. Cooling in this way will insure perfect fit on mandrel of phonograph.

907. Core not thread, wound, found at regular temp. in slightly warm mold. Left in until dead cold. Came out all right did not crack. In others I tried in this way some of them did crack however.

No Molding

908. Core wound with coffee wire. Came out very good, but the expense of wire is too great

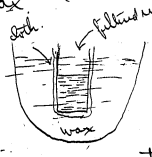
909. Core wrapped with muslin. Came out fairly good, but cracked, after it had stood several days.

910 Wax heated to 500° poured at this temp, into cold mold. The idea of this is to see if the mold will stay liquid enough while in the mold, to allow the bubbles to raise to top. Bubbles were found in the cylinder, mostly fine ones, the larger ones having risen.

No. 911

Filtering # 621.

A cylinder is made of iron netting about 6in diameter and 1½ ft long, this is covered with muslin (twill) and sunk in molten wax, the top being left open. Following is view of filter in wax.



This arrangement filters more than 10lb to the hour.

Mo. Molding # 971.

912. Old thin cylinder mold was used it having a thin skulled core.

Tem. of mold 60°
" " wax 340°

Poured in medium heat.

This cylinder came out perfect.

From this experiment it shows that the ~~core~~ thickness of the core in relation to that of the outside mold has a great deal to do with the sunken-in flows of the cylinder.

No. On ~~making~~ # 871 Non electric.

913 #871 —— 100 gm.

Balsam (Canada) 5"
Softened it some, but improved ~~the~~ cut. Taking electrical property of #871 as 10. this one would come at about 7.

914. # 871 —— 100gm.
Canada Balsam 3"
very good wax, polish cut, more cohesive.
Electrical — about 8,

915 No 871 —— 140 gms.
Camphor — 5"

Barry mf.
Electrical — about 5.

No. making 871 non Electric

916 # 871 — 100
Caramel — 5-
no good.

917 No 887 — 100
Salicylic Acid (anorffh) — 5-

918 #871 — 100
Benzoic Acid 5-

919 # 871 — 100
Gallic Acid — 5-

920 # 871 — 100
Pyro Gallic Acid — 5-

921 # 871 — 100
Tannic acid 5-

Mo. On non Electric frying # 871.

922. # 871 — 100
Alpha Naphthol — 5

923. No 871 — 100
Silicate Soda — 5

924. # 871 — 100
Chloride Zinc 5

926. # 871 — 100
Alum — 5

927 # 871 — 100
Borax — 5

928 # 871 — 100
Venice Turpentine — 5

929 Chloride of ammonia 5
871 — 100

No. On Mosh & Electric frying # 871.

930 # 871 — 100
Arsenious acid 5.

931 # 871 — 100
Inuzstate Soda — 5

932 # 871 — 100
Molybdenic acid 5.

933 # 871 — 100
Zinc Oxide 5.

934 # 871 — 100
Chromic Oxydat 5

935 # 871 — 100.
Talc — 5.

936 # 871 — 100
Fe. Chromic — 5

937. # 871 — 100
Camphor — 24

Considerable softer than # 871, about as soft a corundum 100 crocus 30. Harding on surface after time.

Too Soft.

Crystaline.

The best yet. Scarcely any electrification while #871 is triturable. Probably the great change is caused by evaporation of camphor which carries away the electricity.

Not practical as the camphor will evaporate leaving a poor surface.

The best talking up to now obtained on this one, not a sound to be heard other than the talking, with the exception of slight crackling noise and then.

Some what electrical

No 6 on Non Electrification of #871.

938. # 871 — 100
Camphor 10.

939. Phenate of soda 100
Camphor 10.

940. # 871 — 100
Camphor 5.

941 # 871 — 100.
Cofabia Balsam 7.

942 Cofabia Balsam 5
871 — 100.

Bang Up!!!

No. Mon Electrization of #871.

943. #871 — 100
Cofabia 5 } 100
Camphor 5.

944. #871 — 100
Oil mace — 5

945. #871 — 100
Fatty oil Cassia 5

946. #821 — 100
Oil Cassia — 5

947. #811 — 100
Balsam Sulphur — 5

948. #871 — 100
Tyrnal — 5

949. #871 — 100
Red cedar oil — 5

Mo Mon & Intrical agation of #871.

9.50 #871 — 100
Copabia — 3
Camphor — 5

9.51½ No 871 — 1½
Copabia 3
Camphor 5

9.57 #871 — 100
Rosin from Balsam Copabia 5
Camphor 5

9.51½ Steam — 2000
Steam 2nd. 475 cc

9.52 #871 is adapted as regular and not made in phonograph records
63425 gum — Steam.
Steam solution 15" 063½ @ C.
came out good but was pinkish from the iron of kettle.

Dec 6th 1888.

No. On Preserving Records of Sounds on wax Cylinders

953

The idea is to coat the cylinder with a thin film, that will not wear under the influence of the (receiver or reproducer) stylus, or by handling etc. Such a film might be a separate compound, as collodion, varnishes, silicates, (solubles) The might be ~~coated by~~ applied by brush or by dipping in solution of the film required; the solvent afterward drying and leaving the film on surface of wax.

Or the cylinders might be composed of asphalt compounds or something which when after wards treated would become hard on surface. This might be done by [illegible]

See N-85:113 page 89-91 (Hill) →

No. Preserving Records.

of autonomy and other chemicals.

954 Guncotton applied in solution of alcohol, ether and acetate amyl, by a camel's hair brush, the cylinder being revolved while applying the solution

953 Solution of guncotton in acetate of amyl, ether and alcohol, less amyl being used than in # 954.
Must be applied quickly and not rubbed much with the brush.

956 To be continued when have more time.

Some difficulty was encountered in the shape of bubbles which would form in putting it on The talk was not harmed

Dried quicker, and came about same as # 954,

This made every thing O.K. and was excepted by Mr. P. as regular for the time being, or until something better turned up.

No. Softening #871.

956 Trouble was found in working #976 in phono works as it would not turn smooth in the knived we had, and when they did get a good knife it would not keep in good condition long, making it impractical to work, so the following experiments were made to soften #871 a little.

2000 gms Stearic.
200 " Red oil
500 cc standard solution

957 Stearic and 3000 gms.
Red Oil 150 "
Stand Solution 750 "

No Improvering # ~~X~~ 871.

958. Stearic acid (very crystalin) 5 00gm
Spermaceti 15-0 "
Stand solution 170 cc.

crystalin, but gave good cut on cooling surface (little soft) too much solution used.

Gave remarkable phenomenon in crystalization. Fig 1 shows elevation of cylinder, ~~and~~

Fig 2 Section a-b of Fig 1.

Fig 3 shows plan.

In fig 2 each dark ring indicates the amorphorous layer and space between the crystalin part, there were ~~four~~ 4 distinct layers of ammorphous wax, which extruded all the way around the cylinder, 2 being inside the wall.

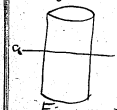


Fig 1.

Fig 2.

Fig 3.

Very hard and cohesive, and not nearly so electrical as #871

Mc. Improving #871.

959. Stearic Acid (very crystalline) 500.
Linseed Oil Boiled — 30
Standard saturation Lye — 170 c.c.

960 #871 — 100
Spermaceti — 12.

961 #871 — 100
Syr. Asphalt — 10

962 #871 — 100
Syrian Asphalt — 5

963 #871 — 100
Syr. Asphalt — 20

964 #871 — 100
Soft Mix. Asphalt — 5

No. Improving 871.

965. # 871 — 100
Soft Mex Asph — 10

966. # 871 — 100
Soft Mex Asphalt — 20

967. # 871 — 100
Soft Mex. Asphalt — 5
Sulphur — ½

968. #871 — 100
Camphor and gun cotton — 5
(see opposite)

969. # 871 — 100
Camphoric gun cotton — 10

Camphoric gun cotton is the product formed by adding gun cotton to hot melted camphor. The gun cotton seems to decompose and dissolve in the camphor. Makes an amorphoz tough yellow waxy mass.

No. 9 improving # 871.

970 # 871 — 100,
Linolic acid — 1½

971 Camphor melted and boiled with HNO_3 until it turns black HNO_3 is stirred from time to time.

972 # 971, with gum cotton dissolved into it while melted.

973 Camphor and linseed oil first mixed and oxydized by linolic acid.

974 # 871 — 100
971 — 10

975 # 871 — 100
971 — 5

979 (b)
High Oleate of Lead, is formed by saponifying oleic acid with all the potash or soda it will take and precipating by acetate of lead. Has been dissolved ~~in water~~ and the water evaporated.

No. 9 improving #871.

976 #871 — 100.
#973 — 3.

977 #871 — 100
#972 — 5

978. #871 — 100
#972 — 10

979 #871 — 100
High Oleate of Lead 5
(see opposite) 979(b)

980 #871 — 100
Soft Mex Asphalt — 10
Sulphur — ½

No. Improving #971.

991 Sublimate obtained, when camphor is boiled with HMO_3, saponified by potash.

992 Stearate of soda (neutral) in which acetate of amyl has been found, in the hope of making stearate of amyl.

993 Some of Solution of 992 precipated by acetate of lead solution.

994 #972 dissolved in alcohol, for varnish? beautiful.

995 #971 oxydized more, dissolved in alcohol.

No 9 improving # 871.

996. Stearic acid in fusil oil, with H Cl gas passed through, might make stearate of amyl.

997. # 871 — 100
Acetate amyl — 4

998 # 871 — 100
acetate of amyl. 10

999. # 871 — 100
guncotton in amyl acetate 5

990 # 871 — 100
guncotton in amyl acetate 10

991 # 871 — 100
Sulphide of antimony 5

Um

No. Improving #871.

992. #871 —— 100
Sulphide of antimony 10

993. #871 —— 100
Sugar —— 10

994 #871 —— 100
Sugar —— 5—

995 ~~#875~~ #871 —— 100
Chloride Strontia 5—

996 #871 —— 100
Chloride Strontia 10

997. #871 —— 100
Hydro Sulphuret Rubrum 5—

998. #871
Hydro " " 10

Dr.

No.	9 inferring #871.
999	#871 — 100
	Sulphur — 1
1000	#871 — 100
	Sulphur — 2
1001	#871 — 100
	Sulphur — 5
1002	#871 — 100
	Sulphur — 10
1003	#871 — 100
	Sulphur — 20
1004	#871 — 100
	Sulphur — 30.
1005	#871 - 100 + ammonia Phosphate 5
1006	" " " + " " 2
1007	" " " + " " 10

Om.

No	
	Improving # 871.
1008	# 871 – 100 + Potassia Sulfhydrate 2
1009	" " – " + " " " ?
1010	Wool is dissolved in K H O solution one part wool to three of K H O, and oxydised by two parts permanganate pottash. The solution decanted and filtered. CO_2 is passed through to neutralise excess of pottash. Then it is precipated by acetate of lead.
1011	Camphor dissolved in acoholic pottash and oxydised by permanganate pottash.
1012	Tartaric acid is melted dried with tri hydrate of alumina.

made a very amorphous mass, tough perfect cut, transparent, mass which after word dried and cracks

On.

No	Improving # 971.
1013	Stearate of aluminum (metal) made in wet way.
1014.	Hypo phosphite (or pulpafe the phosphite of soda has a remarkable effect on carnauba wax, making it soft with nice cut. Violent action takes place when heat is run too high.
1015.	Melted Stearic acid in dish that had previously had MnO_2 in it; dish was rinsed out; then added chromic oxide (chromic acid) after stirring it exploded with bright yellow flame for an instant just like metallic sodium would in

hot water.
afterward found that the soda had nothing to do with it.
a string dipped in stearic acid at about 150°F and sprinkled with chromic acid burned with a light almost equal to oxygen – hydrogen – calcium light.
Might make candles in this way.

a small wire ~~dipped~~ sponge on end of wire, dipped in alcohol and then in solid chromic acid burns. good cigar lighter & ~~soda~~ found to be impracti

No. Useful Determinations.

1016 Amount of Lewis lye in 100 cc of solutions of —
1,340° Sp. Gr. at 78°F = 43.10 gm.
Lewis' lye of 1,200 contains 100 gm dry lye in 425 cc of solution.

1017 Amount of Lewis lye required to make neutral stearate of soda =
Stearic acid — 100
Soda — 17
(Anhydrous NaHO) = (12.5)

1018 Amount of Al_2O_3 in standard solution = 7.05-94 gm to 100 gm Lewis dry soda.

No.	Determinations
1019	Amount acetate of alumina in standard solution = 40.7 gms to 100 of dry Lewis' soda.
1020	Amount of Trihydrate of alumina in standard solution = 10.766 gms to 100 gms dry Lewis' soda

The percent of Na_2O in initial stearate of soda = 12.7

Not ½ scratch of regular.—
makes splendid musical cylinder
very hard, will probably require
soft cutter — can't be filtered
well — molds nicely — only
smooth edge on records can
be used on account of hardness,
can track deep, works well as
a thin or thick veneer.
Low melting point, pours low temperature. The cylinder I tried was
filtered.
Edison.

OM. May 30 1889. (29)

No. A hard wax for musical cylinders.

1022 Purified Cedar Berry Wax 500 gm.
Carnauba (first grade) 400 "
Dry acetate of Alumina 40 "
Cook well to get off acetic acid
Color light Brick red — there
is considerable precipitated
alumina uncombined in
the wax which causes the
material to filter slowly.

Talks very good, noiseless, smooth, loud, insoluable, loud talking, and in fact perfect except the chips wont go through chip box on account of their peculiar nature.

No. Musical Cylinder

1023 Carnauba — 500 } 100
Stearate al. 100 }
Ceresin — 20.

1024 Made same as #671 except Montelulla stearic acid is used which is much harder made very hard and in fact ~~too~~ hard wax.

1025 #1024 softened by bees wax in the proportion 100 of #1024 to 20 bees wax. very good musical.

On

No. Preventing Reg from being ~~susceptible~~ affected by moisture.

1026. It was found that the cylinders made from Regular (#957) were attacted by moisture of the air. This was a very serious matter as records on cylinders became spoiled and the cylinders that were sent out made of this material had to be called back. At the time #957 was introduced it was cool weather and they were not affected, but when the hot moist summer weather came, cylinders exposed to it, were badly corroded on surface.

No. Moisture Proofing Ryndex.

1027. Oleic acid or rather the oleate of soda formed in the wax was found to be the cause of wax being affected by moisture

1027. The stearic acid we were getting at the time was found not to be as good as that bargained for, it contains oleic in considerable quantity, samples were obtain from Mitchell & Co which were very hard and free from oleic.
#871 (Made from Mitchell's) 100
Cerasin 5

No.	Water Proofing Regular Wax.	
1028	# 871 (made from Mitchells Stearic)	100
	Ceresin	10
1029	# 871 (made from Mitchells Stearic)	100
	Ceresin —	20
1029½	# 871 (made from " ")	100
	Ceresin —	30

This is O.K. absolutely not affected by moisture, can be soaked over night in water without showing it. Talks even better than old Reg, and makes an excellent musical cylinder. Molds O.K. and at lower temperature. Excepted by Mr Edison as regular.

Plant having 500 lbs. per day capacity was started ~~at~~ for making # 1030.

Does not duplicate Reg.

No 9 Improving 1029.

1030. The idea of this experiment is to see if we can't do away with the expensive acetate of aluminum.

1030 Mitchells Stannic acid — 1000 gms.
Lewis lye — 1701
Precipitated by aluminum washed and dried.

1031. Mitchells Stanic — 500
Lewis. ley — 40

1032. # 1031 — 100
1030 — 10

1033 # 1031 — 100
1030 — 15

On

No.	9 inferring Regular Wax	
1034	Stearic acid (Mitchells)	400
	Lewis Ley —	36
1035	#1034 —	100
	#1030 —	10
1036	#1034 —	100
	#1030 —	15
1037	Stearic (Mitchells)	400
	Lewis Ley —	40
1038	#1037 —	100
	#1030 —	10
1039	#1037 —	100
	#1030 —	15

This duplicates #871 (made from Mitchells stearic acid) except no acetate is used in it makes quicker and easier.

Ou.

No.	Improving Reg.	
1040	Gleam (Mitchells) —	500
	Lewis' Reg —	35
1041	# 1040 —	100
	# 1030 —	10
1042	# 1040 —	100
	# 1030 —	15
1043	# 1034 —	100
	# 1030 —	15
	Ceresin —	5
1044	# 1034 —	100
	# 1030 —	15
	~~Ceresin —~~	
	Paraffin —	5

This is an exact duplicate of Rig (1029) and is much cheaper and easier to make. The acetate of Alumina being done away with. Excepted by Mr Edison.

On.

No.	Improving Regular Wax
1045.	# 1034 — 100
	# 1030 — 15
	White Wax — 5
1046.	# 1034 — 100
	# 1030 — 15
	Cerasin — 30
1047.	# 1034 — 100
	# 1030 — 15
	Cerasin — 20
1048.	Metastable Stearic — 100 } 100
	C.P. Ma 140 — 9
	Cerasin 20
	Stearate Alumina 15

Om.

Me C | mproving regulator

1049 #1048. — 100
Boiled Cofabia — 10

1050 #1048 — 100
Cofabia Balsam — 5

1051 #1048 — 100
Rosin — 5

See N= 890530 p.43
#1052 No 22
June 13, 1889
Some note.

After standing some time these cracked, that is some of them.

(149)

No. Vernon Cylinders.

1052 Made for vernon cylinders for Wangerman to take to Europe. Strained through Berry filter cloath.

Bees Wax 10395 gms.
Cannauba 8316. "
Dry acetate of alumina 831 gm.
The acetate is added in small lots and well stired. Tem not exceding 500.

Plaster forms and thin shell experiments.
With #1029 as wax.

#1052 1/2.

Cylinders dipped on polished brass mandrill large size and the smaller tapers thereon ordinary mandrills; the cold mandrill is dipped in the wax (305° F.) and left on mandrill until cool, mandrel was oiled with castor oil. The shell of wax came off mandrill and did not crack.

#1052 2/3 Dipped in same wax as #1052 1/2
Temperature 310°. Oiled mandrill.
Dipped 1 min.
left on mandrill until cool) = 1 hr.
temp. of room 90°
6. Wax left on mandrill over night.

#1052 1/4 Dipped same as 1052 1/3, cooled in cold water, surface of wax scarcely attacked by the H_2O.

#1052 1/2 - Temp of wax 320° temp of room = 99°
Dipped 1 min. left on mandrill 1 hour.

Idea of above thin shells is that they are used as the cut and mould with a core inside, in which plaster paris is poured out between shell and core so as to form a backing for shell. Works good for small but cracks over large mandrills.

No. Making Veneers.

1053 Asphalt cylinder is dipped (on brass mandrill) in #1046. at as low a temp. as the wax will stand without forming scum on surface, and held a length of time which shall depend on the thickness of the veneer wanted.
Veneers can be made 3/32" thick in this way.
The asphalt cylinders have to have their surfaces prepared with some substance such as, rubber bollitta gum, dissolved in some solvent which will evaporate, and makes in order to insure the wax to stick. They will not crack when they stick

Too much carbonate would not all dissolve, and made high melting point wax.

Quite good but, not quite enough carbonate.

all O.K. exact duplicate of Reg made other ways and much cheaper and quicker made.

Aug 14/1899, (155)

No. Another Improvement on Reg.

1055. Stearic Acid ~~500~~ 500 gm.
Crystalized Carbonate soda 202.5 gm.

1056 Stearic Acid 500
Carbonate Soda 140

1057 Stearic Acid 500 gm
Carbonate Soda (cryst) 150 gm
Crystals washed, and powdered in mortar, and added to melted stearic little, by little, ~~Melts~~ at 230° F.

1058 #1057 — 100
Stearic Al — 15
Ceresin — 30

Mo.

1059. It was found, that the washed crystals, can be used in making #1054 without grinding them up, which makes it cheaper yet. The crystals come a 1½# pr lb., they are picked over and wash those which are dirty. dissolved and recrystalized, which is a very small percent.

1059½ #1054 With stearate Al made in large plant.

No. Determinations.

1060. In making stearate of alumina
To saponify 75 lb Stearic
acid use 24543 cc Lewis' lye
of specific gravity 1,200°.

No.

1064. For molding cylinder rec. Edison decided to use hard rubber still dipped in Rug wax.

For Velvet Music # (of Substitute for hard rubber experiments) for base coated with # 1047

No. Sept 13th 89.

1065 Mitchels Steam — 4000 gm.
Crystals of Carbonate — 1200 "
To duplicate 105-9.

1066. #1036 — 100
Petroleum residue (or wax) — 10
Idea being to do away with repulsive
cerasin. Petroleum wax comes at ¼ ℔/gal.
Makes very polished cut hard
cohesive, but scratches on phonograph.

1067. #1036 — 100
Petroleum wax — 20.
Too soft, very polished cut,
about 15 to 100 of #1036 will fetch it.

Nov. Reduction of Steam from Sept 16 to Nov. 89.
Wool Wax having oleic acid
in it (#957)

1068.

amount of waste wax (#957) = 500 gm.
Dissolved in about two gal. water,
Precipitated by 50 gm SO_3 = 45.4 gm —
of solution of H_2SO_4 at 120° B/gr.
Flame was slightly too much H_2SO_4.
Weight of dried precipitated fats = 475 gm.
Weight of fat distilled = 428 1.

No. Melting points.

1869. Mitchells Stearic acid melts at 131½°F
2nd " comp —
3rd "
4th "
5th "

(light coloured, not burned)
#105 melts at — — — 236°F

No. Miscellaneous. Experiments.

1072. Carnauba is distilled in vacuno

a The fat which came ~~first~~ over first, white with tinge of yellow, very much softer than carnauba, but harder than bees wax.

b. Second sample from #1072. about same as 1a)

c Third sample about the same as a

d Fourth sample a little lighter and harder than c).

#1073. #1059 Made in phonograph works in large kettle (nickeled) came out O.K. And on test the cylinders were found to talk even better than others not any crackels, which I think were due to antiquated in old process

No.	Music cylinder base.
1074.	# 123 of book #579 molded in screw press, in mold fitted with piston the material is first made and then placed in the mold, the whole heated to about 250°F. and pressed while hot.

Boxe for Reg + Music Cylinders molding

1073 of wax over boxe already made.
This cylinder is fitted on to a hollow
core having water hose connected
so as to keep it cool ~~flowed~~ in
a ~~jacketed~~ mold which is
kept warm.
Wax poured as usual

1076 Molded in same mold as in
#1075 this is cooled this a time
after the wax has been poured
~~the~~ core was a regular
one not cooled.

No. Oct 24th 1889.

1074 #1074 diffed in regular wax
Came out bad had no bubbles
in which came from the compound
in the sub-cylinder
Could not dif over $\frac{3}{44}$ thickness of
wax

1079. #1074 cylinder has a cylinder
of veg wax which has been
diffed on a mandrel the same
size as the outside of the cylinder
diffed over it while the wax
cylinder is yet plastic
works splendid makes a fine
cylinder and they can be
made with $\frac{1}{8}$" thickness of wax.

No.

1079. The mandrel for diffing cylinders to be shrunk on sub cylinders should be 2" diam. straight i.e. no taper, +5" in long. and should be diffed for one minute in wax at 280° F.

The machine for diffing should run at about 44 revolutions per min.

1090 The sub-cylinders is coated (diffed) in paraffin 100 rosin 100 camauba 5 to make the outside shell stick better, and not crack.

1081 Ozokerite 100
Bees wax 100
Diffed on paper.
Flexible but gums on knife does not indent very good.

1082 [illegible] 175
[illegible] 100
[illegible] 30
H.O. [illegible] 20
[illegible] 600
[illegible] 300
[illegible] 300

000746

1093 # 1082 dipped on regular cylinder previously turned off. no good, wooly + rough, wax surface spoiled.

1094 # 1082 dipped on brass sleeve (polished very good, good, talk, some scratch, flexible when torn off could not be removed whole even when heated.

1095 # 1082 poured inside of a glass bottle of proper taper these is made to revolve throwing stuff in thin film all over inside of bottle, air is passed in to dry.

#1086 # 1092 Diffed on regular cylinder coated with paraffin
no good, paraffin attacked.

1087. # 1082 formed on glass plate and intended to be cut in strips width of cylinder and then end over lapped while on a standard form.

1088. # 1082 Diffed on brass sleeve coated with silicate soda.

1089. # 1082 Diffed on wax cylinder coated with silicate soda.

1090 Sheet hard rubber $\frac{1}{100}$ thick is diffed in regular wax at 370° F.
After diffing, made into cylinder with two handles hinged together

Bang #1, made firm collapsable cylinder does not crack when bent double.

1100 Cold test on wax cylinders.

1100 Soft fuzzy thread, small wax size, twisting in regular cylinder, dipped double, cold by solid carbonic acid (−108°F.) 4 of these were tryed, all came good.

Did not crack

1101 Same conditions as 1100 except larger size cord was used.

Cracked very bad.

1102 Same conditions, larger size cord coated with balata gum.

Cracked bad,

Useful Data

By experiment, the stearate of alumina used in the manufacture of wax was found to contain 8.75% Al_2O_3

Hence, in making the wax, where 17 lb. of stearate of ~~soda~~ alumina are used to 100 lbs. of stearic acid, 1.4875 lbs of Al_2O_3 added to 115½ lb. stearic acid would make wax containing same proportion of Al_2O_3.

Or in other figures the proportions for making a charge of wax would be.—

Stearic acid	100 lbs. ($C_{18}H_{36}O_2$)
Crystal carbonate soda	29.5 " ($Na_2CO_3 10(H_2O)$)
Anhydrous oxide of alumina	1.288 " (Al_2O_3)
Resin	20.2 "

With Aluminate of soda, the formula would be.

Stearic Acid	($C_{18}H_{36}O_2$) 100 lbs.
Crystal carbonate soda	($Na_2CO_3 10H_2O$) 18.5 "
Aluminate soda	($Al_2O_3 3Na_2O$) 3.618 "
Resin	20.2 "